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the regions of most distinct vision, called *macular* regions, and the depressions within their boundaries, called *foveæ* (singular, *fovea*), vary in position in different birds. In hawks, eagles, kingfishers, and insectivorous birds, which have the eyes placed upon the sides of the head so as to increase the size of the field of vision, two macular regions, and generally two foveæ, are found in the fundus of *each* eye. Dr. Wood infers from this that such birds have stereoscopic, or binocular vision in each eye, and accounts for their wonderful powers of fixation in this way. It is to be doubted whether this inference is correct. Binocular vision requires the production of *two similar images*. How could two images be formed in the same eye with only one lens?

That peculiar organ, the pecten or marsupium, comes in for a share of the discussion. This body is possessed by every bird. It stretches out from the ocular fundus into the vitreous humour almost to the lens. The form and complexity of the pecten vary much in different species. Its function may be to assist in pushing the crystalline lens forward during accommodative efforts, and it may also have something to do with the nourishing of the non-vascular structures within the eyeball.

Dr. Wood asserts that the background of the eye furnishes certain data of value in classification, since "wild species present invariable ophthalmoscopic pictures." On the whole the paper is very readable and well worth consideration.—WALTER P. TAYLOR.

THE BIRDS OF THE CHICAGO AREA, by FRANK M. WOODRUFF, is a bulletin which, in many respects, is a model of what a local list should be. It contains a full description of the territory included in the Chicago area, its climatic influences, and localities of interest; the latter of special interest to not only local but visiting ornithologists.

Many of the conditions opposed to birds are well brought out and one can well comprehend why many species once so plentiful about the head of the lake are now rarely seen.

A dozen full-page half-tones illustrate in a striking manner the more prominent features of the topography. The "List" itself contains 316 species and subspecies, and shows a great amount of careful research. It includes, besides the scientific and common names, all the synonyms, both popular and scientific.

One thing, however, is painfully evident and that is the very small amount of information regarding our birds which has been obtained during the past fifteen years. Mr. Woodruff has been indefatigable in his investigations,

but aside from an occasional record by one of the few ornithologists of this locality he has confined himself almost entirely to his own personal observations. This fact, and because of the size of the area, some parts of which were visited only at intervals of many years, makes the records scattering and often twenty years apart. To overcome this dearth of notes, Nelson's "Birds of Northeastern Illinois" has been quoted so frequently as to make the list, at times, seem more of a compilation than a record of up-to-date observations. Of about fifty birds listed there is nothing noted since 1876. It is therefore evident that many of these species should either be placed in a hypothetical list or else something more recent than a record of thirty-one years standing discovered in regard to them.

It is, however, fortunate for Chicago ornithology that there is one man among its two million inhabitants who has not succumbed entirely to the spirit of commercialism which prevades the Chicago area, and that he has had the courage to put in the shape of a list the results of twenty-five years labor.

Nelson 1876, Ridgway 1889 and 1895, and Woodruff in 1906, are all epoch making periods and we can only express regret that such long intervals elapse between them.

A bibliography, and an index of both scientific and common names, complete a very commendable effort.—F. S. D.

STATE OF NEW YORK; FOREST, FISH AND GAME COMMISSION; 1902-1903, 8th and 9th Reports; Royal 8 vo., pages 456; half tones 156, 38 in color, 20 of them birds.—This is one of the most handsome state reports of its nature ever gotten up; and in the fullness of the ground gone over, the forest and game articles will prove instructive as well as interesting reading. There are two ornithological papers, dealing with "Birds as Conservators of the Forest" and "The Wild Fowls of the St. Lawrence River." The former article is by Dr. F. E. L. Beal, the expert bird-food authority. New York has chosen well a man to show them the beneficial office of birds as destroyers of forest insect pests.

Dr. Beal opens his paper with an account of "Birds that Destroy Insects": how their busy lives are spent in hunting down the hoards of noxious insects that are daily attacking the forest trees. He mentions how some insects are supposed to be protected by their color, smell or taste; but stomach examination proves otherwise as to the keen senses and sharp appetites of their feathered enemies. In many cases where species of insects had strong odors and rank taste which were thought to protect them, these very species were found to form a very important percentage of the birds' food, often eaten to a varying extent by nearly all

1 The Chicago Academy of Sciences | — | The Birds of the Chicago Area | by | Frank Morley Woodruff | — | Bulletin No. VI | of | The Natural History Survey | — | Issued April 15, 1907; pp. 1 222, frontispiece, plates I-XI, all half-tones.

insectivorous species. Dr. Beal heads the list of beneficial birds of the forest with "The Woodpeckers", as taking the lead in the well-fare of tree life. The first colored plate shown of this group, is of a Red-headed Woodpecker at the end of a dead stub, a big brown and yellow-edged grasshopper in its bill ready for the gaping mouth of a young bird humped up on the other side of the stub, in all anxiety and expectation of that hopper. It is the most happy thought for a plate, of the sixteen bird groups, all by that great bird delineator of the present day Louis Agassiz Fuertes. Other plates show the Northern Hairy, White-backed Three-toed and Black-backed Three-toed Woodpeckers, the Yellow-bellied Sapsucker, and male Flicker. Dr. Beal also mentions that the Warblers, Vireos, Chickadees, Creepers, Cuckoos, Orioles, Robins, Kinglets, Pine Grosbeaks, Crossbills, Crows, and Blue Jays, all play an important part as conservors of the forest. Crows, Blue Jays, Crossbills and many of the Woodpeckers perform a great part, in the planting of tree seeds, which replenish the forests. Birds of prey are also shown to be of some benefit by keeping down the many smaller mammals so destructive to young tree growth.

In the concluding article, "The Wild Fowl of the St. Lawrence River", by J. W. Dunham, are shown three colored plates by Fuertes, of the Hooded Merganser, Pintail and Golden-Eye; there are also nine half-tone plates of nests and birds from life. Mr. Dunham gives an account of the water fowl's habits, as they occur on the St. Lawrence River, and mentions such restriction as should be made to protect them and other game of this river once so famed for its wild fowl.—W. O. E.

The Bulletin of the Illinois State Laboratory of Natural History for April, 1907, pp. 305-335, contains a very novel article by S. A. FORBES, Ph. D., which is entitled, "AN ORNITHOLOGICAL CROSS-SECTION OF ILLINOIS IN AUTUMN."

The paper deals with the science of ecology, or the relations of organisms to their environment, animate or inanimate. At the outset the two terms, special ecology and general ecology, are discriminated between, special ecology being the ecology of *one* species, while general ecology is the study of the ecology of a whole assemblage of species. Most work previously carried on in this line has dealt with special ecology. This article is given up to a discussion of the general phase of the study in a truly original manner.

There has been carried on in the past, by the Biological Survey and by various other laboratories, considerable study of the food habits of various species of birds. Dr. Forbes conclusively shows that the data in this line which has been accumulated is not practically

applicable until the *relative numbers* and *exact distribution* of each species are known.

Two students were sent out by the Illinois State Laboratory to traverse the state in various directions, keeping accurate account of the distance traveled, birds seen, and crop areas passed over. The trip considered in this paper was made across the state from east to west in a straight line, from Danville, near the Indiana line, to Quincy, on the Mississippi. The men traveled 50 yards apart for the whole distance, taking account of all birds seen within this strip and 100 yards in front of them. Crops of corn, wheat, clover, timothy, millet, fruit, and timber were passed thru, and some pasture, meadow, stubble, plowed ground, yard and swamp lands were included in the strip.

The most numerous bird was the English Sparrow, 1620 of the 4804 birds seen belonging to that species. In all, 92 species of birds were observed, altho 85 per cent of the individual birds seen belonged to 15 species.

The bulk of the paper consists of tables of numerical facts, worked out from the data furnished by the two field observers. In these tables every possible relation of each species of bird to every other and to the various crops is taken into account.

In point of area corn was the principal crop, with the area in pasture land and stubblefield coming next.

From the tables it is apparent that the English Sparrow was the principal corn-field species; the Meadow Lark was most abundant in stubble fields and fields of young wheat; in pasture land the English Sparrow was the commonest, with the Crow-blackbird a close second; the Meadow Lark and Cowbird were equally abundant in meadows; Horned Larks were most numerous on plowed ground; while the ever-present English Sparrow was most numerous in orchards.

By taking the ratio of the birds found in a particular crop to the whole number of birds as a dividend, and the ratio of the area in that crop to the entire area as a divisor, the *frequency ratio* of the bird and crop in question is found. Then by dividing the frequency ratios of a species for each crop by its frequency ratios for all the other crops, the *coefficients of preference* are obtained.

The article closes with a table of the 92 species identified, with the numbers of each. It is characterized thruout by the mathematical precision with which the observed facts have been recorded. A new and instructive line of work is opened. It would certainly seem that the true ecological significance of the birds of a community could be gotten at in no surer or simpler way than this. In place of general inferences, results have been actually figured out, accurately and graphically.—WALTER P. TAYLOR.